Charles Darwin University

Final Examination

Family Name						
Given Name/s						
Student Number						
Teaching Period	Semester 1, 2019					

HIT234 – Database Concepts	DURATION	
	Reading Time:	10 minutes
	Writing Time:	180 minutes

INSTRUCTIONS TO CANDIDATES

Answer all the questions. If information appears to be missing from a question, make a reasonable assumption, state it and proceed.

EXAM CONDITIONS

<u>You may begin writing from the commencement of the examination session.</u> The reading time indicated above is provided as a guide only.

This is a RESTRICTED OPEN BOOK examination

No calculators are permitted

One A4 sheet of handwritten double-sided notes permitted

No dictionaries are permitted

ADDITIONAL AUTHORISED MATERIALS	EXAMINATION MATERIALS TO BE SUPPLIED
No additional printed material is permitted	1 x 16 Page Book

THIS EXAMINATION IS PRINTED DOUBLE-SIDED.

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Problem Solving Questions
Total Number of Marks for this section: 100 Marks

This exam should be answered in the Answer Booklet provided.
ALL Question MUST be answered.

Marks for each question are indicated

Question 1: ER Diagrams

(25 marks in total)

For each of the below scenarios draw a separate E-R Diagram including attributes, cardinalities and identifiers when applicable.

a) DarwinCom Pty Ltd is made up of a number of departments that manage none or more projects. Each project is made up of none or more team members. Each team member belongs to one department and zero to one project. One of the team members supervise the other team members on the project.

b) A company has four departments. Each department has one manager. Each department employs staff. Each staff may work for one or more departments. A staff may be supervised by another staff at least.

c) A car insurance company whose customers own one or more cars each. Each car has associated with it zero to many number of recorded accidents.

d) A university registrar has the following entities: Courses (including course number, title, credits, syllabus, and prerequisites); Course offerings, (including course number, year, teaching period, instructors, timings and classroom); Students (including student-id, name, and program); and Instructors (including identification number, name, department, and title). The enrolment of students in courses and grades awarded to students in each course they are enrolled for must be appropriately modelled. An instructor could teach in only one course. Each course only runs in one session

e) Employees (identified by EMP-ID, SURNAME, FIRST-NAME, and Date-of Birth) make many orders (identified by ORDER-NO, ORDER-DATE, DES, WUOTED-PRICE) for Customers (Identified by CUST-ID). The orders are for one customer at a time but a customer might have many orders. The orders create many requests (Identified by REQUEST-NO, START-DATE, END-DATE). Those requests might result in few jobs (identified by JOB-NO, COST) and consequently will use different materials (identified by MATERIAL-ID, MATERIAL-DES). The requests are made to one section but a section has many requests.

Question 2: Relationships

(15 marks in total)

Consider the following 3NF relations about a sorority or fraternity:

MEMBER (Member_ID, Name, Address, Dues_Owed)

OFFICE (Office_Name, Officer_ID, Term_Start_Date, Budget)

EXPENSE (Ledger_Number, Office_Name, Expense_Date, Amt_Owed)

PAYMENT (Check_Number, Expense_Ledger_Number, Amt_Paid)

RECEIPT (Member_ID, Receipt_Date, Dues_Received)

COMMITTEE (Committee_ID, Officer_in_Charge)

WORKERS (Committee_ID, Member_ID)

a) Show which attributes are foreign keys and justify your decisions.

b) Draw an E-R diagram for these relations, using your answer in part a.

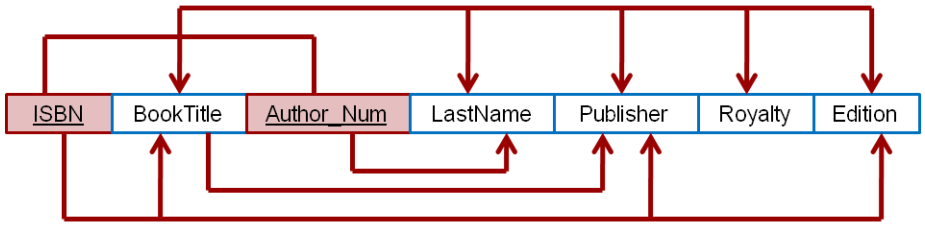
c) Explain the assumptions you made about cardinalities in your answer to part b. Explain why it is said that the ER data model is more expressive or more semantically rich than the relational data model.

Question 3: Normalization

(25 marks in total)

a) Assume that at Darwin Furniture products are comprised of components, products are assigned to salespersons, and components are produced by vendors. Also assume that in the relation PRODUCT(Prodname, Salesperson, Compname, Vendor) Vendor is functionally dependent on Compname, and Compname is functionally dependent on Prodname. Eliminate the transitive dependency in this relation and form 3NF relations. (10 marks)

b) The dependency diagram in the Figure below indicates that authors are paid royalties for each book that they write for a publisher. The amount of the royalty can vary by author, by book, and by edition of the book. (15 marks)



1. Based on the dependency diagram, create a database whose tables are at least in 2NF, showing the dependency diagram for each table.

2. Create a database whose tables are at least in 3NF, showing the dependency diagram for each table.

Question 4: SQL statements

(20 marks in total)

The following is the relational schema of part of the database that HighTech Pty Ltd recently implemented:

DEPARTMENT (DeptNo, Name, Location)
EMPLOYEE (EmpNo, Name, Street, City, Postcode, HireDate, Salary, DeptNo)
LEAVE (EmpNo, FromDate, ToDate)
EMPQUAL (EmpNo, QualID)
QUALIFICATION (QualID, Qualification, Institution)

Using the above schema, write SQL queries that will answer/process the following:

a) List all cities where an employee lives. Only show the city once.

b) What is the lowest salary paid for any employee that lives in the city of Darwin?

c) For each qualification, show the total number of employees that have that qualification. Show qualification id, qualification and the total number.

d) List any employees who are on annual leave on 01/05/2018. Note, date format is #01-05-2018#. Show employee number only.

e) What is the total salary cost incurred by HighTech for employees in the Marketing department?

f) List the employee(s) with the highest salary. Show employee number and name.

g) List the employee names and all of the institutions that they have studied at.

h) How many employees have no qualifications?

i) Delete all leave rows if the leave ended prior to the start of this year.

j) Increase the salary of all employees by $80.

Question 5: Views and Granting

(15 marks in total)

Using the tables in Appendix A

a) What are the advantages of using VIEW in SQL?

b) Using SQL statement Create a VIEW showing the details of all Customers who have returned an Automobile.

FirstName	LastName	Suburb	Reg No	Make	Year	Date Taken	Date Returned
Mohamed	Griffin	Nightcliff	BRG446	Ford	2009	15/11/2011	
Anna	Thanh	Coconut Grove	NMT667	Madza	2010	16/11/2011	
Justin	Brownworth	Nakara	CCT899	Toyota	2009	17/11/2011	

c) Create a query using the new view to find the customer in Coconut Grove or Bayview.

FirstName	LastName	Suburb	Reg No	Make	Year	Date Taken	Date Returned
Anna	Thanh	Coconut Grove	NMT667	Mazda	2010	2/09/2011	3/09/2011

d) As an owner of this **view** GRANT permission to user s989232 to enable him/her full access rights.

Appendix A

Automobile

Reg No	Make	Model	Year	Colour
BRG446	Ford	Meteor	2009	White
VRG655	Bmw	Coupe	2008	Blue
NMT667	Madza	Delivery Van	2010	Green
CCT899	Toyota	HiLuxe	2009	Red
FGR122	Mitsubishi	Magna	2007	Purple

Customer Table

Employee_No	FirstName	LastName	Suburb
A118	Mohamed	Griffin	Nightcliff
A120	Ali	McDonald	Brinkin
A123	Albert	Underwood	Rapid Creek
A134	Sammy	Smith	Casuarina
A156	Anna	Thanh	Coconut Grove
A166	Justin	Brownworth	Nakara

Customer Automobile Table

Employee_veh	Reg No	Employee_No	Date Taken	Date Returned
B-12	BRG446	A118	1/09/2011	3/09/2011
B-13	NMT667	A156	2/09/2011	3/09/2011
B-14	CCT899	A166	2/09/2011	4/09/2011
B-15	FGR122	A134	3/09/2011	5/09/2011
B-16	BRG446	A118	4/09/2011	10/09/2011
B-17	NMT667	A166	5/09/2011	10/09/2011
B-18	NMT667	A134	11/09/2011	15/09/2011
B-19	FGR122	A166	12/09/2011	15/11/2011
B-20	NMT667	A118	14/11/2011	15/11/2011
B-12	BRG446	A118	15/11/2011	
B-13	NMT667	A156	16/11/2011	
B-14	CCT899	A166	17/11/2011	